



Master Biologie Moléculaire et Cellulaire 'BMC',  
Université de Paris - UFR Sciences du Vivant

Parcours : **Biologie et Développement Cellulaires 'BDC'**

<http://www.master2bdc.fr/>

Fiche de Projet de Stage M2, Année 2021-2022

<b>Unité INSERM ou CNRS ou Université :</b> Institut Cochin, Inserm U1016, CNRS 8104, Université de Paris <b>Intitulé Equipe :</b> « From Gametes To Birth » <b>ED d'appartenance :</b> BioSPC  <b>Responsable de l'Equipe :</b> Daniel Vaiman	<b>Responsable du Stage : Julie Cocquet</b>  <b>Email :</b> <a href="mailto:julie.cocquet@inserm.fr">julie.cocquet@inserm.fr</a>  <b>Adresse :</b> Institut Cochin. Equipe Vaiman, groupe « epigenetics & spermatogenesis », 24 rue du Faubourg St Jacques, 75014 PARIS  <b>Website :</b> <a href="https://www.institutcochin.fr/la-recherche/drc/equipe-vaiman/epigenetic-spermatogenesis">https://www.institutcochin.fr/la-recherche/drc/equipe-vaiman/epigenetic-spermatogenesis</a>
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**Titre du projet :** Gene and chromatin regulation during the differentiation of male gametes.

**Résumé du Projet de Stage** (en 300 mots maximum, mots clés en gras)

Approximately one man out of ten suffers from infertility, with a spermatogenesis defect in many cases. The cause, whether genetic or environmental, remains often unknown, with ~75% of male infertility defined as 'idiopathic'.

Our group studies spermatogenesis at the **gene and the chromatin level** using **omics, in vivo** and **in vitro** approaches, to identify and characterize novel regulators/pathways required for gamete differentiation and **male fertility**. Our group also aims at studying the impact of **spermatozoa epigenetic program on reproductive efficiency, embryo development and progeny's health**. Indeed it is now well-known that, upon fertilization, the sperm cell contributes to the embryo with more than its DNA. Epigenetic information (chromatin, RNA molecules, DNA modifications, etc.) can be **transmitted to the embryo** and could affect embryo development and offspring health, in case of deregulation. It is therefore essential to better understand the processes controlling the establishment of **sperm cell epigenome** during gamete differentiation.

We are looking for a **M2 student interested in carrying on with a PhD**. Two research projects are proposed:

- (1) Functional and molecular characterization of novel candidate genes identified by our group (histone writers and readers) during spermatogenesis using cell and mouse models (conditional knockout, siRNA or CrispR-Cas9).
- (2) Characterization of the sperm cells epigenome in physiological and pathophysiological conditions on patient samples, in collaboration with Cochin Hospital Biology of Reproduction Unit.

For both projects, the M2 student will be trained in cutting-edge molecular and cell biology experiments including (epi)genomics analyses and will benefit from the host team and institute scientifically dynamic environment and from their state-of-the art equipment (<https://www.institutcochin.fr/linstitut>).

**Publications de l'équipe, relatives au stage proposé :**

- Moretti et al. (2020) Battle of the Sex Chromosomes: Competition between X and Y Chromosome-Encoded Proteins for Partner Interaction and Chromatin Occupancy Drives Multicopy Gene Expression and Evolution in Muroid Rodents. **Mol Biol Evol**. doi: 10.1093/molbev/msaa175.
- Crespo et al. (2020) Multi-omic analysis of gametogenesis reveals a novel signature at the promoters and distal enhancers of active genes. **Nucleic Acids Res**. doi: 10.1093/nar/gkaa163.
- Blanco & Cocquet (2019). Genetic Factors Affecting Sperm Chromatin Structure. **Advances in Experimental Medicine and Biology**. Review. doi: 10.1007/978-3-030-21664-1
- Moretti et al. (2017) SLY regulates genes involved in chromatin remodeling and interacts with TBL1XR1 during sperm differentiation. **Cell Death Differ**. doi: 10.1038/cdd.2017.32